REMARKS/ARGUMENTS

Claims 1-20 are pending.

Claims 1-20 were rejected under 35 U.S.C. Section 103 in view of Beardsley et al. (U.S. Pat. No. 6,304,980) and Armangau et al. (U.S. Pat. No. 6,434,681).

Claim 17 as originally filed has not been amended. Independent claims 1, 12, and 15 have been amended to follow the language of claim 17. The Section 103 rejection is traversed on the basis of the remarks which follow. Reconsideration of the Section 103 rejection is respectfully requested.

Present Invention

Claim 1 recites in pertinent part:

... a plurality of primary volumes ..., wherein each primary volume is assigned a priority;
    selecting a first request from a plurality of requests placed in a queue based on priority information associated with the requests, wherein each request is directed to a given primary volume and is assigned the same priority as the given primary volume; ... .

See also independent claims 15 and 17.

Independent claim 12 recites in pertinent part:

... a plurality of primary volumes, wherein each request is assigned a priority according to the primary volumes to which said each request is directed;
    sorting the requests according to priority assigned to the requests;
    retrieving one of the requests in the order by which the requests have been sorted;
    ... .

The present invention as recited in the pending claims is directed to a storage system having remote copy capability. Each primary volume is associated with a priority. Remote copy requests are queued based on the priority of the primary volume designated by the request. Requests are serviced in order according to their respective priorities.

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PATENT

Section 103 Rejection

1.   "primary volume ... assigned a priority" is not taught

Claim 1 recites in part (see also claims 15 and 17):

... a plurality of primary volumes ..., wherein each primary volume is assigned a priority; ... .

Beardsley was cited for allegedly teaching this element at column 16, lines 32-45, referring to the rejection of now-canceled claim 2 (Office action, page 4):

> 5.   As per claim 2, the claim is rejected for the same reasons as claim 1,
> above. In addition, Beardsley discloses wherein each of the primary volumes
> is assigned a priority (volumes are serialized, col 16, lines 32-45).

However, a review of this cited portion of Beardsley reveals that he is describing the serialization of *data*, NOT storage volumes:

> "With the present invention, however, there is no failure here because the system can guarantee that <u>the data</u> on the volume <u>remains serialized</u> by the reserve during the duration of the swap and that the system owning the reserve will continually own the reserve after the swap completes and the device is unquiesced." *Col. 16, lines 40-45 (emphasis added)*

Beardsley clearly describes maintaining the serialization of the data in the processing step 810 that is described in the cited paragraph. Beardsley does not mention that the volumes are serialized. Thus, to the extent that the Office action relied on "serialized volumes" for teaching assigning priorities to the primary volumes, Beardsley does not teach assigning priorities to the primary volumes because Beardsley does not teach "serialized volumes."

Moreover, the undersigned respectfully submits that "serialized volumes" does not explicitly or inherently teach assigning priorities to primary volumes to begin with. First, it is not clear what is meant by "volumes are serialized" since Beardsley does not teach this. Secondly, arranging volumes serially implies nothing about priority.

Thus, Beardsley does not teach "... a plurality of primary volumes ..., wherein each primary volume is assigned a priority" as substantively recited in claims 1 and 15 as amended and in claim 17 as originally filed.

Armangau was not cited for this claim limitation. Moreover, a review of Armangau does not reveal any teaching of assigning priorities to primary volumes.

For this reason alone, the Section 103 rejection of the claims is believed to be overcome.

2. "each request is ... assigned the same priority as the given primary volume" is not taught

Claim 1 further recites in part:

> selecting a first request from a plurality of requests placed in a queue based on priority information associated with the requests, wherein <u>each request</u> is directed to a given primary volume and is <u>assigned the same priority as the given primary volume</u>; ... (emphasis added)

See also amended claims 12 and 15, and claim 17 as originally filed.

As discussed above, Beardsley does not teach priorities assigned to primary volumes. It therefore follows that Beardsley does not teach "each request is ... assigned the same priority as the given primary volume."

Armangau was cited at column 19, lines 27-64 for allegedly teaching the claim element which recites this specific limitation (Office action, page 3). Armangau discloses a technique for snapshot copying without delay to host read/write operations. A review of the cited portion of Armangau reveals a discussion about the use of an allocated record queue 172 and a free record queue 171 which stores "records." A "record" points to an area of storage, either RAM storage or disk storage, that is used to store units of data ("tracks") to be backed up.[1] The cited passage mentions the word "priority" at line 60. However, reading Armangau in the proper context reveals no description of assigning priority to a request. Rather, Armangau was merely noting that his free record queue was arranged such that records which point to RAM storage have priority over records which point to disk storage.[2] Armangau therefore does not teach "each request is ... assigned the same priority as the given primary volume."

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[1] Column 20, lines 23 and following explain the use of the record queues in connection with the flowchart of Fig. 15.
[2] presumably for the reason that RAM access performance is better than disk access performance

3.   "selecting a first request from a plurality of requests placed in a queue based on priority information associated with the requests" is not taught

Claim 1 further recites in part:

selecting a first request from a plurality of requests placed in a queue based on priority information associated with the requests, wherein each request is directed to a given primary volume and is assigned the same priority as the given primary volume; ... .

See also amended claim 15 and 17 as originally filed.

Claim 12 similarly recites:

... sorting the requests according to priority assigned to the requests;
retrieving one of the requests in the order by which the requests have been sorted;

Armangau was cited at column 19, lines 27-64 for allegedly teaching the claim element which recites this specific limitation (Office action, page 3). As explained above, Armangau's queues 171, 172 store records, which point to storage in RAM or disk storage. The queues do NOT store requests. Armangau explains that when a request to backup an extent is received a read/write station is allocated along with its associated queues. The allocated read/write station is then assigned to the request. *Col. 19, lines 37-40.* Armangau does not teach that the request is queued up in a queue. In fact, Armangau's Fig. 15 describes what happens when a request is received. There is no disclosure about prioritizing the request, or even queueing up the request. The process begins at step 191 by getting a record from the head of the free record queue. Armangau, therefore, completely fails to teach "selecting a first request from a plurality of requests placed in a queue."

As noted above, Armangau does not teach assigning priorities to requests, nor does Armangau teach that the request is queued up in a queue. Armangau, therefore, does not teach "selecting a first request from a plurality of requests placed in a queue based on priority information associated with the requests."

For at least these reasons, the Section 103 rejection of the claims is believed to be overcome.

4.   **combined teachings of Beardsley and Armangau do not render obvious the pending claims**

Neither Beardsley nor Armangau teach primary volumes being assigned priorities. Neither Beardsley nor Armangau teach requests have priorities and are queued. Therefore, the combined teachings of the two references likewise do not teach or even suggest primary volumes being assigned priorities or that requests have priorities and are queued.

For at least these reasons, the Section 103 rejection of the claims is believed to be overcome.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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